Single-night stay for open radical prostatectomy

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Abstract

Introduction: The aim of this study was to assess the effect of an enhanced care pathway on length of stay (LOS) for open radical prostatectomy (RP) given that robotic-assisted laparoscopic prostatectomy (RALP) is not available to all patients in Canada.

Methods: A retrospective review was conducted of all RPs performed. An enhanced care pathway was established for RPs in 2011. Patients were compared in the period before (2005–2010) and after (2011–2019) the introduction of the pathway.

Results: During the study period, 581 RPs were performed by a single surgeon with a median followup of 66.9 months (range 3–176). A total of 211 (36.3%) RPs were performed from 2005–2010, while 370 (63.9%) were performed from 2011–2019. The median age at RP was 65 years (range 44–81). Following the introduction of an enhanced care pathway, there were significant decreases in intraoperative blood loss (350 ml vs. 200 ml; p=0.0001) and the use of surgical drains (90% vs. 9.5%; p=0.0001). The median LOS over the whole study period was one day (range 1–7), which significantly decreased with the enhanced care pathway (3 vs. 1 day; p=0.0001). Since introducing the enhanced care pathway in 2011, 344 (93%) patients were discharged day 1 following surgery. There were no differences in post-discharge presentations to the emergency department (5.7% vs. 9%; p=0.15) or 30-day readmission rates (3.8% vs. 3.8%; p=1.00).

Conclusions: A single-night stay for open RP is safe and achievable for most patients. A dedicated, multifaceted pathway is required to attain targets for a safe and timely discharge.

Introduction

Prostate cancer is the most common form of non-cutaneous cancer among Canadian men. It is estimated 23 300 new cases will be diagnosed in 2020, representing 20% of all cancers diagnosed in men.[1]

Radical prostatectomy (RP) remains one of the main treatment strategies for all stages of non-metastatic prostate cancer.[2,3] For low-risk disease, active surveillance (AS) remains the preferred option, however, RP is an option for patients who decline AS. For intermediate-risk disease, RP is a curative option for patients with >10 years life expectancy, while for high-risk disease, RP is an option as part of a potential multimodal approach. RP can be performed with open, laparoscopic, or robotic techniques. Although the majority of RPs in the U.S. and U.K. are now performed robotically,[4-6] there is no level 1 evidence to support any oncological or functional benefit.[7,8] There are, however, some clinically meaningful benefits, such as shorter length of stay (LOS), as well as decreased blood loss, transfusion rates, and analgesic requirements.[8-10] LOS is variable depending on surgeon, hospital, and country. LOS reported with robotic-assisted laparoscopic prostatectomy (RALP) is approximately one day (although some expert centers are now reporting same-day surgery), whereas LIS with open RP is upwards of two days.[7,11-13]

Currently, RALP is only available through philanthropic donor programs. A health technology assessment was performed in 2017 and opted not to provide public funding for RALP given "the costs of using the robotic system were relatively large while the health benefits were deemed relatively small."[11] RALP is, however, funded in some provinces, such as Alberta.

The aim of this study was to assess the effect of an enhanced care pathway on LOS for open RP given that RALP is not available to all patients in Canada.

Methods

A retrospective review was conducted of the institutional case log to identify all RPs performed by a single surgeon (RN) from January 2005 to September 2019. Patient demographics, operative details, and pathological characteristics were collated from each patient's electronic chart (Table 1). Followup was determined from the date of surgery until date of last clinic followup or death.

An enhanced care pathway was established for RPs in 2011. The pathway promoted a single-night LOS in a short-stay unit. The extraperitoneal operative technique — via a lower midline incision — remained consistent throughout

the study period. Pelvic lymph node dissections were performed based upon nomogram-calculated risk of lymphovascular invasion. Closed suction drains were used sparingly at the surgeon's discretion. Patients were fasted from midnight and received prophylactic low molecular weight heparin and antibiotics at induction of general anesthesia. Local anesthetic (20 ml of 0.25% bupivacaine) was infiltrated to the wound at the end of the procedure. Patients were ambulated the same day and diet was advanced as tolerated. Patients were discharged with a Foley catheter for 14 days. Analgesia requirements were managed by the urology service; postoperatively, patients routinely received a combination of acetaminophen, ketorolac, and hydromorphone (as required). Patients were discharged with a prescription for acetaminophen and 10 tablets of hydromorphone 1 mg, as required, as well as oxybutynin for bladder spasms. To meet discharge criteria, patients needed to be mobile, tolerating diet, and comfortable on oral analgesia. Patients were discharged home and not to a stepdown facility.

Patients were compared in the period before (2005–2010) and after (2011–2019) the introduction of the enhanced care pathway. Categorical variables, such Gleason score, recurrence, and readmission rates, were summarized with counts and percentages. Continuous variables, such as age at diagnosis, prostate-specific antigen (PSA), blood loss, LOS, and followup were summarized with median and range. The level of significance was set at p=0.05. Statistical analyses were performed using version 9.4 of the SAS system for Windows (2002–2012 SAS Institute, Inc., Cary, NC, U.S.). The study was approved by institutional review board.

Results

During the study period, 581 RPs were performed by a single surgeon, with a median followup of 66.9 months (range 3–176); 211 (36.3%) were performed from 2005–2010. At the beginning of 2011, an enhanced care pathway was introduced and 370 (63.9%) RPs were performed from then until September 2019. The patient demographics and histopathological characteristics are detailed in Table 1.

The median age at RP was 65 years (range 44–81). The median PSA at diagnosis was 6.6 ng/dL (range 0.25–273). There was no difference in PSA between the two study periods (6.7 vs. 6.6, p=0.31).

Disease was organ-confined (pT2) in 335 patients (57.7%), with more organ-confined disease in the earlier time period (64% vs. 54.1%, p=0.02). Negative surgical margins were achieved in 437 (75.2%) patients, which remained consistent throughout the study (76.8% vs. 74.3% in early vs. post-enhanced care pathway, respectively; p=0.55). An undetectable PSA was detected in 493 (84.9%) patients (82% vs 86.5% in early vs. post-enhanced care pathway, respectively; p=0.15). A biochemical recurrence occurred in 157 (27%)

Table 1. Patient demographics and histopathological characteristics

	Total (n=581)	2005–2010 (n=211)	2011–2019 (n=370)	p
Age at RP, years (median, range)	65 (44–81)	64 (44–76)	65 (44–81)	0.005
PSA at diagnosis, ng/mL (median, range)	6.6 (0.25–273)	6.7 (0.25–70)	6.6 (1.1–273)	0.31
Clinical stage (n, %)				
No DRE performed*	3 (0)	0 (0)	3 (0.8)	
T1a	1 (0)	1 (0)	0 (0)	
T1b	8 (0)	0 (0)	8 (2.2)	
T1c	420 (72.3)	152 (72)	268 (72.4)	
T2a	95 (16.4)	40 (19)	55 (14.9)	
T2b	22 (3.8)	10 (4.7)	12 (3.2)	
T2c	8 (0)	1 (0)	7 (1.9)	
T3a	20 (3.4)	7 (5.2)	13 (3.5)	
T3b	2 (0)	0 (0)	2 (0.5)	
T4	2 (0)	0 (0)	2 (0.5)	
TRUS biopsy Gleason score (n, %)				
No biopsy performed†	2 (0)	0 (0)	2 (0.5)	
3+3	127 (21.9)	75 (35.5)	52 (14.1)	
3+4	238 (41)	73 (34.6)	165 (44.6)	
3+5	1 (0)	0 (0)	1 (0)	
4+3	92 (15.8)	26 (12.3)	66 (17.8)	
4+4	54 (9.3)	17 (8.1)	37 (10)	
4+5	62 (10.7)	19 (9)	43 (11.6)	
5+4	2 (0)	0 (0)	2 (0.5)	
5+5	3 (0)	1 (0)	2 (0.5)	
RP Gleason score (n, %)				
No score assigned‡	1 (0)	1 (0)	0 (0)	
3+3	81 (13.9)	40 (49.4)	41 (11.1)	
3+4	267 (46)	93 (44.1)	174 (47)	
3+5	2 (0)	1 (0)	1 (0)	
4+3	135 (23.2)	45 (21.3)	90 (24.3)	
4+4	13 (2.2)	1 (0)	12 (3.2)	
4+5	66 (11,4)	24 (11.4)	42 (11.4)	
5+4	14 (2.4)	5 (2.4)	9 (2.4)	
5+5	2 (0)	1 (0)	1 (0)	
RP pathological stage (n, %)				0.02
T2	335 (57.7)	135 (64)	200 (54.1)	
T3a	145 (25)	50 (23.7)	95 (25.7)	
T3b	96 (16.5)	24 (11.4)	72 (19.5)	
T4	5 (0)	2 (0.9)	3 (0.8)	

*Three patients did not have a digital rectal examination, as they had previous abdominoperineal resections and closed anus. †Two patients did not have a biopsy for the same reason above; one of those had a transperineal biopsy. The two without biopsy had PI-RADS 5 lesions on MRI and a high PSA. ‡One patient did not have a Gleason score assigned to their prostatectomy specimen due to the effects of neoadjuvant ADT and radiation treatment. ADT: androgen deprivation therapy; DRE: digital rectal examination; MRI: magnetic resonance imaging; PSA: prostate-specific antigen; RP: radical prostatectomy.

Table 1 (cont'd). Patient demographics and histopathological characteristics

	Total (n=581)	2005–2010 (n=211)	2011–2019 (n=370)	p
Surgical margins (n, %)				0.55
Negative	437 (75.2)	162 (76.8)	275 (74.3)	
Positive	144 (24.8)	49 (23.2)	95 (25.7)	
T2 positive	37 (11)	18 (13.3)	19 (9.5)	
≥T3 positive	107 (43.5)	31 (40.8)	76 (44.7)	
Pathological node status (n, %)				
Nx	281 (48.4)	122 (57.8)	159 (43)	
N0	256 (44.1)	82 (38.9)	174 (47)	
N1	44 (7.6)	7 (3.3)	37 (10)	
Postoperative PSA (n, %)				0.15
<0.02	493 (84.9)	173 (82)	320 (86.5)	
>0.02	88 (15.1)	38 (18)	50 (13.5)	
Biochemical recurrence (n, %)	157 (27)	65 (30.8)	92 (24.9)	0.14
Radiation treatment (n, %)	121 (20.8)	52 (24.6)	69 (18.6)	0.09
Followup, months (median, range)	66.9 (3-176)	104 (3-176)	38.2 (3-106)	
Salvage RP (n, %)	35 (6)	17 (8.1)	18 (4.9)	

*Three patients did not have a digital rectal examination, as they had previous abdominoperineal resections and closed anus. †Two patients did not have a biopsy for the same reason above; one of those had a transperineal biopsy. The two without biopsy had PI-RADS 5 lesions on MRI and a high PSA. ‡One patient did not have a Gleason score assigned to their prostatectomy specimen due to the effects of neoadjuvant ADT and radiation treatment. ADT: androgen deprivation therapy; DRE: digital rectal examination; MRI: magnetic resonance imaging; PSA: prostate-specific antigen; RP: radical prostatectomy.

patients (30.8% vs 24.9% in early vs. post-enhanced care pathway, respectively; p=0.14) while 121 (20.8%) patients received adjuvant/salvage radiation (24.6% vs 18.6% % in early vs. post-enhanced care pathway, respectively; p=0.09).

Following the introduction of an enhanced care pathway, there were significant decreases in intraoperative blood loss (350 ml vs. 200 ml, p=0.0001) and the use of surgical drains (90% vs. 9.5%, p=0.0001) (Table 2). The median LOS over the whole study period was one day (range 1–7), which significantly decreased with the enhanced care pathway (3 vs. 1 day, p=0.0001). Since introducing the enhanced care pathway in 2011, 344 (93%) patients were discharged one day after surgery.

There were no differences in post-discharge presentations to the emergency department (ED) (5.7% vs. 9%, p=0.15) or 30-day readmission rates (3.8% vs. 3.8%, p=1.00) in early vs. post- enhanced care pathway populations, respectively. There was, however, a significant reduction in 90-day readmission rate after the introduction of the protocol (11.4% vs. 5.1%, p=0.008).

Discussion

RALP is the foremost approach for RP in many jurisdictions. Currently in Ontario, it is not publicly funded. Herein, we performed a retrospective analysis of a high-volume open surgeon's experience with RP in a unit with an enhanced care pathway. Our results demonstrate that open RP can be performed with a single-night LOS in most patients, a LOS similar to most RALP series.

The enhanced care pathway was associated with a two-day decrease in LOS. An initial concern was that by discharging patients home early, there would reflexively be an increase in presentations to the ED and a higher readmission rate; neither was evident in our study. In fact, the 90-day readmission rate decreased. Some centers in North America discharge patients to a stepdown facility, which obviously aids an early discharge. That is not the practice at our institution, where patients are discharged home without any routine home nursing followup. A two-day decrease in LOS results in substantial health economic savings, as well as increasing bed availability in our overloaded Canadian health service.

Cost is a significant factor with regards to the establishment of any new program, even more so in a publicly funded system. Some of the advocates of RALP offset the capital and maintenance costs associated with the robotic surgical system against the presumed decreased LOS.[14] A Cochrane review also demonstrated open RP was associated with a longer LOS (mean difference 1.72 days).[15] In an analysis of nearly 70 000 RPs in the U.S between 2010 and 2015, RALP was associated with a higher perioperative cost compared to open RP (approximately $3000/case) but a shorter LOS (mean difference of approximately one day).[16] Similar higher costs were apparent in a 10-year study of 630 000 RPs across 49 hospitals in the U.S.; RALP was approximately $4500 more expensive than open RP, primarily due to operating room and disposable costs.[17] These costs were no longer significantly different among the highest-volume surgeons (≥104 cases/year, +$1990, p=0.40) and highest-volume hospitals (≥318 cases/year, +$1225, p=0.39). Although we did not perform a cost analysis, nor have a RALP cohort for comparison, we demonstrated LOS similar to most reported RALP series.

Same-day or outpatient RALP has been described by some experienced prostatectomists.[12,18-22] We have yet to attempt this but do feel this may be possible in select patients (close proximity to the institution, first case of the day, fit/slim patient, social support). Abaza et al described a series of same-day discharges following RALP.[12] Same-day discharge was managed in 49.2% of patients; the remaining patients were all discharged at postoperative day 1. Interestingly, 70% of the cases performed first in the day were same-day discharges compared with only 2% of the third cases of

Table 2. Peri- and postoperative details

	Total n=581	2005–2010 n=211	2011–2019 n=370	p
Blood loss, ml (median, range)	250 (50–2100)	350 (100–2100)	200 (50–1400)	0.0001
JP drain (n, %)	225 (38.7)	190 (90)	35 (9.5)	0.0001
LOS				0.0001
Median, days (range)	1 (1–7)	3 (1–7)	1 (1–6)	
1 night (n, %)	352 (60.6)	6 (2.8)	344 (93)	
Clavien Dindo complications ≥3 (n, %)	10 (1.7)	2 (0.9)	8 (2.2)	0.51
Presentations to ED (n, %)	46 (7.9)	12 (5.7)	34 (9)	0.15
Readmissions				
30-day (n, %)	22 (3.8)	8 (3.8)	14 (3.8)	1.00
30- to 90-day (n, %)	43 (7.4)	24 (11.4)	19 (5.1)	0.008
90-day readmission indications				
Urinary tract infection	4 (0.7)	2 (0.9)	2 (0.5)	
Urinary retention	2 (0.3)	1(0.5)	1 (0.3)	
Wound infection	1 (0.2)	1 (0.5)	0 (0)	
Lymphocele	3 (0.5)	0 (0)	3 (0.8)	
Hematuria	20 (3.4)	12 (5.7)	8 (2.2)	
Bladder neck stenosis	13 (2.2)	8 (3.8)	5 (1.4)	

ED: emergency department; JP: Jackson Pratt; LOS: length of stay.

the day. Of note, this study was conducted in a very experienced, high-volume prostate service (>3000 RALPs by a single surgeon); the 500 cases described in that series were performed in an 18-month period, a similar number to our 15-year series.

Enhanced Recovery After Surgery (ERAS) protocols have been shown to aid early discharge. In urology these have been best-described in bladder cancer for radical cystectomy.[22-25] ERAS protocols reduce morbidity and LOS through to the implementation of multidisciplinary, perioperative steps. Consensus has been reached for key principles regarding nutrition, anesthetic, analgesia, and early mobilization.[26] It is difficult to identify which parameters of an ERAS protocol are most important. Although most of these protocols described pertain to robotic surgery, the principles are likely applicable to open surgery. The key is a multidisciplinary pathway on achievable patient milestones (mobilization, diet, analgesia). This combined pre-, peri-, and postoperative approach focuses the patient on recovery and a planned early discharge.

This study is inherently limited by its retrospective design. Surgery was performed by a high-volume open pelvic oncologist well beyond his learning curve. A referral to a unit with an established RALP program was offered to all patients at diagnosis. All patients were managed on a dedicated urology short-stay unit with an emphasis on single-night stay. As a result, these results may not be generalizable in a lower-volume unit; however, we believe with an enhanced care pathway, improvements in open RP are achievable with a comparable LOS to patients undergoing RALP. No doubt RALP will become publicly funded in Ontario in time; until that happens, we need to strive to achieve comparable results with open RP.

Conclusions

A single-night stay for open RP is safe and achievable for most patients. A dedicated, multifaceted pathway is required to attain targets for a safe and timely discharge.

Competing interests: The authors report no competing personal or financial interests related to this work.

This paper has been peer-reviewed.

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